

# *Antarctic Meteorite NEWSLETTER*

A periodical issued by the Antarctic Meteorite Working Group to inform scientists of the basic characteristics of specimens recovered in the Antarctic.

Volume 3, Number 2

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The Meteorite Working Group will meet next on September 12, 1980, to consider sample requests for Antarctic meteorites. Submit requests to:

John O. Annexstad  
Secretary, Meteorite Working Group  
Curator's Branch, SN2  
NASA, Johnson Space Center  
Houston, TX 77058

At their last meeting in April, the MWG allocated samples of 48 meteorites to 14 investigator groups for scientific study and samples of 280 pebble-sized (<150g) meteorites to 5 investigator groups for classification and study. Classifications of these pebbles are to be reported within one year. In addition, consortium studies were established for six eucrites and two ordinary chondrites. Filling of these meteorite allocations is expected to take most of the summer.

## Mailing Address Verification:

We are currently mailing over 500 copies of the Antarctic Meteorite Newsletter. Some of these are being returned marked "moved" or "insufficient address." Anyone who has moved since initially receiving the Newsletter should verify that we have his or her correct mailing address. In addition, if anyone wishes to be dropped from our mailing list, we would appreciate your letting us know.

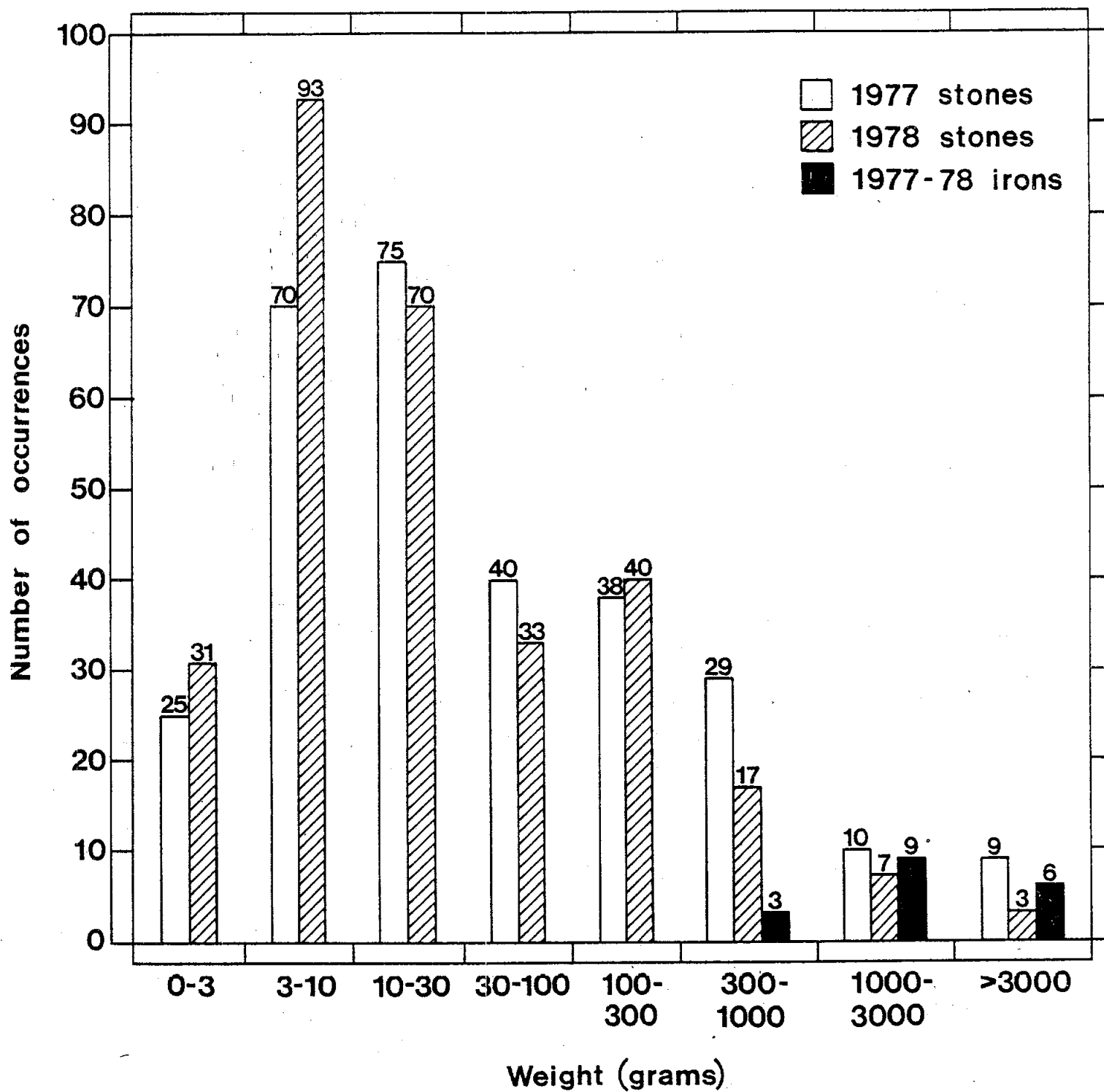
Catalogue of Antarctic Meteorites, 1977-78

A monograph with this title is in press by the Smithsonian Institution, and will probably be published in July 1980. It incorporates the information contained in Antarctic Meteorite Newsletters through June 1979, with additional material and numerous illustrations and photomicrographs of individual meteorites. If you wish to receive a free copy of this publication, please type or print your name and address on a 3"x5" card and mail it to:

Mineral Sciences  
Smithsonian Institution  
Washington, DC 20560  
USA  
Attn: B. Mason

Newly Announced Meteorites and Summary Listings:

Reported in this Newsletter are data sheets on a number of additional meteorites from the 1977 and 1978 collections. Except for pebbles, processing and classification of meteorites in the 1977 and 1978 collections are essentially complete. Consequently, we give here summary lists of all meteorites of  $>150$  g which exist in the 1977 and 1978 collections. Note that in a few cases individual meteorite classification or weathering/fracturing categories have been changed compared to previous listings. We also give in this Newsletter histograms of individual meteorite weights, including pebble-size specimens. Over 90% of the specimens in these histograms are from Allan Hills, and they may reflect a statistically significant sampling of specimens by weight at this site. The 1977 collection contains 303 meteorite specimens; the 1978 collection contains 305 meteorite specimens.



SUMMARY OF  
1977 METEORITE COLLECTION

<u>NUMBER</u>	<u>WEIGHT (GMS)</u>	<u>CLASSIFICATION</u>	<u>WEATHERING</u>	<u>FRACTURING</u>	<u>PAGE</u>
ALHA77001	252.0	L-6 Chondrite	B	B	
ALHA77002	235.2	L-5 Chondrite	B	A/B	
ALHA77003	779.6	L-3 Chondrite	A	A	
ALHA77004	2230.0	H-4 Chondrite	C	C	
ALHA77005	482.5	Achondrite (unique)	A	A	
PGPA77006	19068.0	Iron - Group I or Og			34
ALHA77009	235.5	H-4 Chondrite	C	A	
ALHA77010	295.8	H-4 Chondrite	C	A	
ALHA77011	291.5	LL3 Chondrite	C	A	
ALHA77012	180.2	H5 Chondrite	C	A	
ALHA77014	308.8	H-5 Chondrite	C	B/C	
ALHA77015	411.1	L-3 Chondrite	C	B	
ALHA77021	16.65	H-5 Chondrite	C	A	
ALHA77025	19.40	H-5 Chondrite	C	B	
ALHA77033	9.34	LL-3 Chondrite	C	B	
ALHA77061	12.61	H-5 Chondrite	B	A	
ALHA77062	16.72	H-5 Chondrite	B	B	
ALHA77064	6.47	H-5 Chondrite	B	B	
ALHA77071	10.87	H-5 Chondrite	B	B	
ALHA77074	12.07	H-5 Chondrite	B	B	
ALHA77081	8.59	Achondrite	B	A	
ALHA77086	19.44	H-5 Chondrite	C	B	
ALHA77088	51.15	H-5 Chondrite	C	B	
ALHA77102	12.25	H-5 Chondrite	B	B	
ALHA77118	7.84	H-5 Chondrite	C	B	
ALHA77119	6.36	H-5 Chondrite	C	B	
ALHA77124	4.41	H-6 Chondrite	C	A	
ALHA77140	78.62	L-3 Chondrite	C	B	
ALHA77144	7.88	H-6 Chondrite	B	A	
ALHA77148	13.10	H-6 Chondrite	C	B	
ALHA77150	58.30	L-6 Chondrite	C	B	
ALHA77155	305.3	L-6 Chondrite	A/B	A	
ALHA77160	70.42	L-3 Chondrite	C	B	
ALHA77164	38.14	L-3 Chondrite	C	C	
ALHA77165	30.50	L-3 Chondrite	C	C	

## 1977 ANTARCTICE METEORITE SUMMARY CONT.

<u>NUMBER</u>	<u>WEIGHT (GMS)</u>	<u>CLASSIFICATION</u>	<u>WEATHERING</u>	<u>FRACTURING</u>	<u>PAGE</u>
ALHA77167	611.2	L-3 Chondrite	C	B/C	
ALHA77177	368.2	H-5 Chondrite	C	A	
ALHA77180	190.8	L-6 Chondrite	C	A	
ALHA77182	1109.0	H-5 Chondrite	B	B	
ALHA77183	288.0	H-6 Chondrite	C	A	
ALHA77190	387.1	H-4 Chondrite	C	C	
ALHA77191	642.2	H-5 Chondrite	C	B/C	
ALHA77192	845.3	H-4 Chondrite	C	C	
ALHA77208	1733.0	H-4 Chondrite	C	C	
ALHA77214	2097.4	L or LL Chondrite	C	C	
ALHA77215	819.6	L-4 Chondrite	B	B/C	
ALHA77216	1470.0	L-4 Chondrite	A/B	B/C	
ALHA77217	413.2	L-4 Chondrite	B	B/C	
ALHA77219	637.1	Mesosiderite	B	B	
ALHA77221	229.2	H-4 Chondrite	C	A	
ALHA77223	207.9	H-4 Chondrite	C	C	
ALHA77224	786.9	H-5 Chondrite	C	C	
ALHA77225	5878.0	H-4 Chondrite	C	C	
ALHA77226	15323.0	H-4 Chondrite	C	C	10
ALHA77230	2473.0	L-4 Chondrite	B	B	
ALHA77231	9270.0	L-6 Chondrite	A/B	A/B	
ALHA77232	6494.3	H-4 Chondrite	C	C	
ALHA77233	4087.0	H-4 Chondrite	C	B	
ALHA77249	503.6	L-3 Chondrite	C	C	
ALHA77250	10555.0	Iron - Group I or Og			32
ALHA77252	343.1	L-4 Chondrite w/L6 clasts	B	C	
ALHA77254	245.8	L-5 Chondrite	A/B	A	
ALHA77255	765.1	Iron			32
ALHA77256	676.2	Achondrite (diogenite)	A/B	A	
ALHA77257	1995.7	Achondrite (ureilite)	A	B	
ALHA77258	597.3	H-6 Chondrite	B/C	A/B	
ALHA77259	294.0	H-5 Chondrite	C	B	
ALHA77260	744.3	L-3 Chondrite	C	C	
ALHA77261	411.7	L-6 Chondrite	B	B	
ALHA77262	861.5	H-4 Chondrite	B	B	
ALHA77263	1669.0	Iron - Group I or Og			32

## 1977 ANTARCTIC METEORITE SUMMARY CONT.

<u>NUMBER</u>	<u>WEIGHT (GMS)</u>	<u>CLASSIFICATION</u>	<u>WEATHERING</u>	<u>FRACTURING</u>	<u>PAGE</u>
ALHA77264	10.97	H-5 Chondrite	A/B	A	
ALHA77268	272.0	H-5 Chondrite	C	C	
ALHA77269	1045.0	L-6 Chondrite	B	A	
ALHA77270	588.9	L-6 Chondrite	A/B	B	
ALHA77271	609.5	H-6 Chondrite	A	A	
ALHA77272	674.1	L-6 Chondrite	B/C	B	
ALHA77273	492.0	L-6 Chondrite	B	B	
ALHA77274	288.1	H-5 Chondrite	C	A	
ALHA77277	142.7	L-6 Chondrite	A/B	A	
ALHA77278	312.9	L-3 Chondrite	A	A	
ALHA77280	3226.0	L-6 Chondrite	B	B/C	
ALHA77281	1231.0	L-6 Chondrite	B	B	
ALHA77282	4127.1	L-6 Chondrite	B	B	
ALHA77283	10510.0	Iron - Group I or Og			33
ALHA77284	376.2	L-6 Chondrite	A/B	B	
ALHA77285	271.1	H-6 Chondrite	C	B	
ALHA77286	245.8	H-4 Chondrite	C	B	
ALHA77287	230.1	H-5 Chondrite	C	A	
ALHA77288	1880.0	H-6 Chondrite	B	B	
ALHA77289	2186.0	Iron - Group I or Og			33
ALHA77290	3784.0	Iron - Group I or Og			33
ALHA77292	199.6	L-6 Chondrite	B	A	
ALHA77294	1351.3	H-5 Chondrite	A	A	
ALHA77296	963.3	L-6 Chondrite	A/B	A	
ALHA77297	951.6	L-6 Chondrite	A	B	
ALHA77299	260.7	H-3 Chondrite	A	A	
ALHA77300	234.5	H-5 Chondrite	C	B	
ALHA77302	235.5	Achondrite (eucrite)	A	A	
ALHA77304	650.4	LL-3 Chondrite	B	B	
ALHA77305	940.0	L-6 Chondrite	B/C	B	
ALHA77306	19.91	Carbonaceous Chondrite A C2		A	
ALHA77307	181.30	Carbonaceous Chondrite A C3		A	

SUMMARY OF  
1978 METEORITE COLLECTION

<u>NUMBER</u>	<u>WEIGHT (GMS)</u>	<u>CLASSIFICATION</u>	<u>WEATHERING</u>	<u>FRACTURING</u>	<u>PAGE</u>
ALHA78006	8.0	Eucrite (polymict)	A	A	
ALHA78019	30.3	Ureilite	B/C	C	
ALHA78038	363.0	LL3 Chondrite	C	C	11
ALHA78039	299.0	L6 Chondrite	B	B	11
ALHA78040	211.7	Eucrite (polymict)	A	A	
ALHA78042	214.1	L6 Chondrite	B	A	12
ALHA78043	680.0	L6 Chondrite	B	B	12
ALHA78045	396.5	L6 Chondrite	B/C	B	13
ALHA78048	190.6	L6 Chondrite	A/B	B	13
ALHA78050	1045.0	L6 Chondrite	B	B	
ALHA78053	179.0	H4 Chondrite	C	B	14
ALHA78074	200.2	L6 Chondrite	B	B	14
ALHA78075	280.6	H5 Chondrite	B/C	B	15
ALHA78076	275.6	H6 Chondrite	B	B	15
ALHA78077	330.6	H4 Chondrite	C	B	16
ALHA78078	290.3	L6 Chondrite	A/B	A	16
ALHA78085	219.3	H5 Chondrite	B	B	17
ALHA78102	336.9	H5 Chondrite	B/C	B	17
ALHA78103	589.7	L6 Chondrite	B	B	18
ALHA78104	672.4	L6 Chondrite	B	A	18
ALHA78105	941.7	L6 Chondrite	B	A	
ALHA78106	464.5	L6 Chondrite	A/B	A	19
ALHA78107	198.4	H5 Chondrite	C	A	19
ALHA78108	172.5	H5 Chondrite	B	B	20
ALHA78109	233.2	LL5 Chondrite	A/B	A	20
ALHA78110	160.7	H5 Chondrite	B/C	B	21
ALHA78112	2485.0	L6 Chondrite	B	B	21
ALHA78113	298.6	Aubrite	A/B	A	
ALHA78114	808.1	L6 Chondrite	B/C	B	22
ALHA78115	847.6	H6 Chondrite	B	A	22
ALHA78126	606.9	L6 Chondrite	B	B	23
ALHA78127	194.5	L6 Chondrite	B/C	B	23
ALHA78128	154.7	H5 Chondrite	C	B/C	24
ALHA78130	2733.0	L6 Chondrite	B/C	B	24
ALHA78131	268.8	L6 Chondrite	B/C	A	25

## 1978 ANTARCTIC METEORITE SUMMARY CONT.

<u>NUMBER</u>	<u>WEIGHT (GMS)</u>	<u>CLASSIFICATION</u>	<u>WEATHERING</u>	<u>FRACTURING</u>	<u>PAGE</u>
ALHA78132	656.0	Eucrite (polymict)	A	A	
ALHA78134	458.3	H4 Chondrite	B/C	B/C	25
ALHA78153	151.7	LL6 Chondrite	B/C	B	26
ALHA78158	15.1	Eucrite (polymict)	A	A	
ALHA78165	20.9	Eucrite (polymict)	A	A	
ALHA78251	1312.0	L6 Chondrite	B	A	
ALHA78252	2789.0	Iron - Group IIIA			34
ALHA78261	5.113	Carbonaceous Chondrite - C2	A	A	26
ALHA78262	26.18	Ureilite	A	A	27
BTNA78001	160.7	L6 Chondrite	B	B	28
BTNA78002	4301.0	L6 Chondrite	Not Classified	A	
BTNA78004	1079.0	LL6 Chondrite	B	A	
DRPA78001	15100.0	Iron			
DRPA78002	7200.0	Iron			
DRPA78003	144.2	Iron			
DRPA78004	133.6	Iron			
DRPA78005	18450.0	Iron			
DRPA78006	389.3	Iron			
DRPA78007	11700.0	Iron			
DRPA78008	59400.0	Iron			
DRPA78009	138100.0	Iron			
META78001	624.4	H4 Chondrite	B/C	B	
META78002	542.2	L6 Chondrite	B	A	
META78003	1726.0	L6 Chondrite	B	B	29
META78005	172.0	L6 Chondrite	B	B	29
META78006	409.6	H6 Chondrite	C	B	
META78007	174.8	H6 Chondrite	B/C	B	
META78010	233.5	H5 Chondrite	B	A	30
META78028	20657.0	L6 Chondrite	B	B	30
RKPA78001	234.9	L6 Chondrite	C	B	
RKPA78002	8483.0	H4 Chondrite	B	A/B	31
RKPA78003	1276.0	L6 Chondrite	C	B	
RKPA78004	166.9	H4 Chondrite	A	A	



Field relationships and physical and petrographic similarities suggest that the following specimens are pieces of a common fall:

- 1) ALHA77021, 025, 061, 062, 064, 071, 074, 086, and 088,
- 2) ALHA77004, 190, 191, 192, and 233.
- 3) ALHA77215, 216, 217, and 252.
- 4) ALHA77280, 281, 273, and 277
- 5) ALHA78045 and 043
- 6) ALHA78013 and 104
- 7) ALHA78112 and 114
- 8) ALHA78126, 130, and 131
- 9) ALHA78019 and 78262
- 10) ALHA77306 and 78261

Other paired specimens probably exist.

Sample No.: ALHA77226  
Field No.: 77122901  
Weight (gms): 15323.0  
Meteorite Type: H4 Chondrite

Location: Allan Hills

Physical Description:

A small patch of dull black fusion crust was present on the S surface of the sample. The W surface of the specimen was concave and flow bands were present in the T-B direction. The specimen is severely fractured and during processing crumbled into many pieces. Nearly all the material exposed during processing was extensively stained by iron-oxidation. However, a few small areas on the exposed material are not as severely stained by iron oxidation and appear light gray.

Petrographic Description: Brian Mason

Chondritic structure is well developed, with chondrules ranging from 0.3-1.8 mm in diameter; they are set in a fine-grained granular groundmass of olivine and pyroxene, with minor amounts of nickel-iron and troilite (nickel-iron in excess of troilite). Some of the pyroxene is polysynthetically twinned clinobronzite. Brown limonitic staining pervades the section. Microprobe analyses show olivine ( $Fa_{18}$ ) and pyroxene ( $Fs_{16}$ ) of essentially uniform composition. The meteorite is classified as an H4 chondrite.

Sample No.: ALHA78038  
 Field No.: 278  
 Weight (gms): 363.0  
 Meteorite Type: LL3 Chondrite

Location: Allan Hills

Physical Description:

This angular sample is approximately 12 x 5 x 5 cm. and appears shiny and reddish-brown due to weathering and staining by iron oxidation. Several fractures penetrate deeply into the sample. One small remnant patch of shiny black fusion crust remains on the B surface. During processing the sample fell apart and revealed no unoxidized material.

Petrographic Description: Brian Mason

The section shows a close-packed aggregate of chondrules, 0.3 - 2.7 mm in diameter, and a few angular enclaves (some are chondrule fragments) in a minor amount of dark fine-grained matrix. A wide variety of chondrules are present, the commonest being granular olivine and olivine-pyroxene, porphyritic olivine, and fine-grained pyroxene. Most of the pyroxene is polysynthetically twinned. Many of the chondrules have dark rims. Troilite is present in minor amounts in the matrix. Weathering is extensive, the section being rimmed and veined with brown limonite, and little nickel-iron remains. Microprobe analyses show olivine ranging from  $Fa_4$  to  $Fs_{19}$ , with a mean of  $Fa_{22}$ ; pyroxene ranges from  $Fs_2$  to  $Fs_{19}$ , with a mean of  $Fs_9$  and  $CaO$  ranging from 0.1 to 1.3 weight percent. The low content of nickel-iron and troilite suggests LL group, and the meteorite is tentatively classified as an LL3 chondrite.

Sample No.: ALHA78039  
 Field No.: 288  
 Weight (gms): 299.0  
 Meteorite Type: L6 Chondrite

Location: Allan Hills

Physical Description:

The sample is totally covered with black fusion crust, with the exception of an  $\sim 4.0 \times 2.5$  cm. area that is devoid of fusion crust and reveals a light gray interior. The dimensions of the sample are approximately 8 x 4 x 5 cm. Cleaving the sample revealed a light gray matrix with light gray clasts. A very well defined weathering rind penetrated the sample to a depth of 1 mm. - 1 cm. Scattered areas of oxidized metal were apparent throughout the interior of the specimen.

Petrographic Description: Brian Mason

Chondrules are sparse and poorly defined, with margins that tend to merge with the granular groundmass, which consists largely of olivine and pyroxene with minor subequal amounts of nickel-iron and troilite and some plagioclase. A minor amount of limonitic staining is associated with the nickel-iron grains. Microprobe analyses show olivine ( $Fa_{24}$ ) and orthopyroxene ( $Fs_{21}$ ) of uniform composition; most of the plagioclase is stoichiometric ( $An_{11}$ ), but some has the appropriate Ca content but is considerably deficient in Na, suggesting partial conversion to maskelynite. The meteorite is classified as an L6 chondrite.

Sample No.: ALHA78042  
 Field No.: 268  
 Weight (gms): 214.1  
 Meteorite Type: L6 Chondrite

Location: Allan Hills

Physical Description:

The T surface of this ~5.5 x 4.5 x 5.0 cm sample has a 4 x 3 cm area where reddish black fusion crust has been preserved. The remainder of the sample is composed of fracture surfaces that are weathered reddish-brown. Sawing of the sample revealed a light gray matrix with both rounded and irregular inclusions, as much as 1mm in diameter. The exterior margins of the sample are weathered and stained by iron-oxidation, while the interior of the sample appears relatively fresh.

Petrographic Description: Brian Mason

Chondritic structure is poorly developed; the chondrules are sparse and poorly defined and tend to merge with the granular groundmass, which consists largely of olivine and pyroxene, with minor plagioclase, nickel-iron, and troilite, and accessory chromite. Some of the nickel-iron grains are unusually large, ranging up to 2.5 mm. A minor amount of brown limonitic staining is present around the nickel-iron grains. Microprobe analyses give the following compositions: olivine, Fa<sub>24</sub>; orthopyroxene, Fs<sub>20</sub>; plagioclase, An<sub>10</sub>. The meteorite is classified as an L6 chondrite.

Sample No.: ALHA78043  
 Field No.: 264  
 Weight (gms): 680.0  
 Meteorite Type: L6 Chondrite

Location: Allan Hills

Physical Description:

The sample is approximately 10.0 x 8.5 x 6.0 cm., and covered with a black fusion crust, ~1 mm. thick, that has some weathering. The W surface appears to be less weathered than the remaining surfaces. A large chondrule is present on the B surface. The T surface is a fracture surface with some remnant patches of fusion crust present. The matrix of the sample is yellowish green with some small (<3 mm.) clasts apparent. During processing the sample broke along previously existing fractures, which were weathered and stained by iron oxidation. Only a few metallic flecks were present in the greenish-gray to orangish matrix material.

Petrographic Description: Brian Mason

The section shows sparse chondrules with diffuse margins, tending to merge with the granular groundmass, which consists of olivine and pyroxene with minor subequal amounts of nickel-iron and troilite, a little plagioclase, and accessory chromite. Minor limonitic staining is present around nickel-iron grains. Well-preserved fusion crust 0.5 mm thick is present along one edge. Microprobe analyses give the following compositions: olivine Fa<sub>25</sub>; pyroxene, Fs<sub>21</sub>; plagioclase, An<sub>10</sub>; accessory merrillite was identified with the microprobe. The meteorite is an L6 chondrite.

ALHA 78043 is an L6 chondrite similar in all respects to ALHA 78045.

Sample No.: ALHA78045  
 Field No.: 263  
 Weight (gms): 396.5  
 Meteorite Type: L6 Chondrite

Location: Allan Hills

Physical Description:

The sample is approximately 8.5 x 5.0 x 5.0 cm. and tabular. The blackish-brown fusion crust covers the complete sample with the exception of an 2.5 x 3.5 cm. area on the T/E surfaces which is highly polished and very smooth. In three areas the fusion crust has been removed revealing matrix material that is reddish-yellow. Three large fractures penetrate the sample. During processing the specimen was cleaved along one of the fractures and broke into two approximately equal pieces, revealing no unoxidized material.

Petrographic Description: Brian Mason

The section shows sparse chondrules with diffuse margins, tending to merge with the granular groundmass, which consists of olivine and pyroxene with minor subequal amounts of nickel-iron and troilite, a little plagioclase, and accessory chromite. Minor limonitic staining is present around nickel-iron grains. Well-preserved fusion crust 0.5 mm thick is present along one edge. Microprobe analyses give the following compositions: olivine  $Fa_{25}$ ; pyroxene,  $Fs_{21}$ ; plagioclase,  $An_{10}$ ; accessory merrillite was identified with the microprobe. The meteorite is an L6 Chondrite.

ALHA 78045 is an L6 chondrite similar in all respects to ALHA 78043.

Sample No.: ALHA78048  
 Field No.: 281  
 Weight (gms): 190.6  
 Meteorite Type: L6 Chondrite

Location: Allan Hills

Physical Description:

All sides of the specimen are at least partially covered with fusion crust, that ranges in color from brown to black. In areas where the fusion crust has been removed, a light gray matrix with iron-oxidation staining is revealed. Shallow regmaglypts are present on all sides of the sample. When the sample was cleaved a thin (1-2 mm.) weathering rind was exposed. The interior of the stone was light gray with darker gray inclusions and some unoxidized metal fragments.

Petrographic Description: Brian Mason

Chondrules are sparse and poorly defined, tending to merge with the granular groundmass, which consists of olivine and pyroxene, with minor amounts of plagioclase, nickel-iron, and troilite. Limonitic staining is present in association with nickel-iron grains, and some of the grains have a rim of brown limonite. Microprobe analyses show olivine ( $Fa_{24}$ ) and orthopyroxene ( $Fs_{21}$ ) of uniform composition; most of the plagioclase is stoichiometric ( $An_{11}$ ), but some is deficient in Na, suggesting partial conversion to maskelynite. The meteorite is classified as an L6 chondrite.

Sample No.: ALHA78053  
 Field No.: 267  
 Weight (gms): 179.0  
 Meteorite Type: H4 Chondrite

Location: Allan Hills

Physical Description:

This 8.0 x 6.0 x 2.5 cm specimen has a small amount of thin, shiny black fusion crust on the B face. The remainder of the sample is smooth, weathered and stained reddish-brown by iron-oxidation. Fractures are present on the T and B surfaces.

No unweathered material was exposed in the meteorite during processing.

Petrographic Description: Brian Mason

Chondritic structure is well developed, with chondrules ranging from 0.3-1.1 mm across; the commonest types are porphyritic olivine (with turbid partly devitrified glass between the olivine crystals), granular olivine and olivine-pyroxene, and fine-grained pyroxene. The chondrules are set in a fine-grained granular groundmass of olivine and pyroxene, with minor amounts of nickel-iron and troilite. Some of the pyroxene is polysynthetically twinned clinobronzite. Brown limonitic staining pervades the section, and veinlets and patches of red-brown limonite are present. Microprobe analyses give the following compositions: olivine,  $Fa_{17}$ ; pyroxene,  $Fs_{16}$ . The meteorite is classified as an H4 chondrite.

Sample No.: ALHA78074  
 Field No.: 280  
 Weight (gms): 200.2  
 Meteorite Type: L6 Chondrite

Location: Allan Hills

Physical Description:

This is not a complete specimen. Shiny fusion crust (1-2mm thick) covers B, W, and portions of S, N, and E surfaces. Polygonal fractures are present on the B and N surfaces.

Where fracture surfaces are present they are rough and slightly weathered and stained by iron oxidation. The matrix of the sample is light gray and included clasts and chondrules are darker gray. Some oxidation halos are apparent.

Petrographic Description: Brian Mason

Chondrules are sparse and poorly developed, with margins that tend to merge with the granular groundmass, which consists largely of olivine and pyroxene, with minor subequal amounts of nickel-iron and troilite and some plagioclase; accessory chromite was noted. Well preserved fusion crust, 0.4 mm thick, is present along one edge of the section. A minor amount of brown limonitic staining occurs immediately below the fusion crust. Microprobe analyses give the following compositions: olivine,  $Fa_{24}$ ; orthopyroxene,  $Fs_{21}$ ; plagioclase,  $An_{10}$ . The meteorite is classified as an L6 chondrite.

Sample No.: ALHA78075  
 Field No.: 253  
 Weight (gms): 280.6  
 Meteorite Type: H5 Chondrite

Location: Allan Hills

Physical Description:

A thin, shiny fusion crust covers most of this specimen (7 x 6 x 3 cm), with the exception of portions of the T and W faces. The surfaces devoid of fusion crust are smooth and weathered to a shiny dark reddish-brown. Several non-penetrating fractures are present on the sample.

Light colored inclusions and metal fragments are apparent in the dark matrix material of the sample.

Petrographic Description: Brian Mason

Chondritic structure is well developed, with chondrules ranging from 0.2-1.5 mm across; they include a variety of types, the commonest being porphyritic olivine, granular olivine, and fibrous radiating pyroxene. The groundmass consists largely of fine-grained olivine and pyroxene, with minor amounts of nickel-iron and troilite (nickel-iron in excess of troilite). Brown limonitic staining pervades the section, and some veinlets and patches of red-brown limonite are present. Microprobe analyses give the following compositions: olivine,  $Fa_{18}$ , pyroxene,  $Fs_{16}$ . The meteorite is classified as an H5 chondrite.

Sample No.: ALHA78076  
 Field No.: 252  
 Weight (gms): 275.6  
 Meteorite Type: H6 Chondrite

Location: Allan Hills

Physical Description:

A thin ( $\leq 1$  mm.) black fusion crust covers most of the sample (8.0 x 5.0 x 4.5 cm). Some small areas of the fusion crust have been physically removed and other areas are stained reddish by iron-oxidation. Polygonal fractures are present on the T and N surfaces. In areas where the fusion crust is absent, clasts of 1-2 mm are apparent in the oxidized material. When the sample was cleaved, clasts as much as 3 mm. in diameter were exposed in the grayish matrix material. The sample is friable and only minor amounts of iron-oxidation are apparent surrounding metallic flakes.

Petrographic Description: Brian Mason

Chondrules are present, but are poorly defined and tend to merge with the granular groundmass, which consists of olivine and pyroxene, with minor amounts of nickel-iron and troilite, and a little plagioclase. A rounded aggregate of closely packed chromite grains with interstitial plagioclase, possibly a chondrule, was noted. Minor limonitic staining is present, concentrated around the nickel-iron grains. Microprobe analyses give the following compositions: olivine,  $Fa_{18}$ ; pyroxene,  $Fs_{16}$ ; plagioclase,  $An_{13}$ . The meteorite is an H6 chondrite.

Sample No.: ALHA78077  
 Field No.: 257  
 Weight (gms): 330.6  
 Meteorite Type: H4 Chondrite

Location: Allan Hills

Physical Description:

A thin, shiny, black fusion crust covers this 6.5 x 6.0 x 5.0 cm. specimen. In spots the fusion crust is weathering away, revealing a smooth brownish-red surface. Several deep cracks penetrate the sample. During processing the sample cleaved along one of these fractures, revealing no unoxidized material.

Petrographic Description: Brian Mason

Chondritic structure is well developed, chondrules ranging from 0.3 - 1.5 mm across; the commonest types are porphyritic olivine, granular olivine and olivine-pyroxene, and fine-grained pyroxene. The chondrules are set in a granular groundmass of olivine and pyroxene, with minor amounts of nickel-iron and troilite. Some of the pyroxene is polysynthetically twinned clinobronzite. Limonitic staining pervades the section, and veinlets and patches of red-brown limonite are present. Microprobe analyses show olivine of essentially uniform composition (Fa<sub>10</sub>) and somewhat variable pyroxene (Fs<sub>15</sub>-Fs<sub>18</sub>, mean Fs<sub>17</sub>). The meteorite is classified as an H4 chondrite.

Sample No.: ALHA78078  
 Field No.: 279  
 Weight (gms): 290.3  
 Meteorite Type: L6 Chondrite

Location: Allan Hills

Physical Description:

This 6.0 x 4.5 x 8.0 cm. stone is totally covered with thin, black fusion crust with the exception of the corners of the specimen, which have been removed. Processing of the meteorite revealed a light gray matrix, speckled with light and dark clasts. Fresh metallic material is also present.

Petrographic Description: Brian Mason

Chondrules are sparse and poorly defined, tending to merge with the granular groundmass, which consists largely of olivine and pyroxene, with minor subequal amounts of nickel-iron and troilite, some plagioclase, and accessory chromite. Some of the nickel-iron grains are unusually large, up to 2.4 mm across. Minor limonitic staining is present around some of the metal grains. Microprobe analyses give the following compositions: olivine, Fa<sub>24</sub>; orthopyroxene, Fs<sub>20</sub>; plagioclase, An<sub>11</sub>. The meteorite is classified as an L6 chondrite.



Sample No.: ALHA78085  
 Field No.: 435  
 Weight (gms): 219.3  
 Meteorite Type: H5 Chondrite

Location: Allan Hills

Physical Description:

Only the B surface of the specimen (6.5 x 4.5 x 3.5 cm.) has a very thin, black fusion crust. The remaining surfaces of the sample are fracture surfaces that are weathered and stained a dark reddish-brown. A small clast (~2mm), that appears to be troilite is present on the T surface.

During processing of the meteorite, the brecciated character of the meteorite and the interior light-dark structure was exposed. The light portion of the chondrite exists as numerous clasts in a wide range of sizes. These light colored clasts are surrounded by dark material.

Petrographic Description: Brian Mason

Chondritic structure is well developed in parts of the section, but in other parts it is less prominent, possibly as a result of local brecciation. The chondrules are set in a fine-grained granular groundmass which consists largely of olivine and pyroxene, with minor nickel-iron and troilite (nickel-iron in excess of troilite). Brown limonitic staining is present in parts of the section, along with veinlets and patches of red-brown limonite. Microprobe analyses give the following compositions: Olivine,  $Fa_{18}$ ; orthopyroxene,  $Fs_{16}$ ; plagioclase,  $An_{12}$ . The meteorite is classified as an H5 chondrite.

Sample No.: ALHA78102  
 Field No.: 494  
 Weight (gms): 336.9  
 Meteorite Type: H5 Chondrite

Location: Allan Hills

Physical Description:

A large proportion of the exterior of this 9.0 x 6.0 x 6.0 cm sample is weathered and stained by iron oxidation and spotted with small patches of black fusion crust. Except for the inner most material, this sample is totally weathered. The light matrix material of the inner most material is spotted with iron-oxidation and contains many small (as great as 3 mm. in maximum diameter) dark clasts.

Petrographic Description: Brian Mason

Chondritic structure is fairly prominent, but the margins of the chondrules are frequently ill-defined and tend to merge with the granular groundmass, which consists of olivine and pyroxene with minor amounts of nickel-iron and troilite. Microprobe analyses give the following compositions: olivine,  $Fa_{18}$ ; pyroxene,  $Fs_{17}$ . The meteorite is an H5 chondrite.

Sample No.: ALHA78103  
 Field No.: 243  
 Weight (gms): 589.7  
 Meteorite Type: L6 Chondrite

Location: Allan Hills

Physical Description:

The rounded specimen is approximately 11 x 7 x 4 cm.. The entire sample, with possible exception of a small patch of remnant fusion crust on the E surface, is weathered and stained by iron-oxidation. The B surface is the less severely weathered of all the surfaces, and several chondrules, 3-5 mm in diameter, are apparent. The matrix of the sample is greenish-gray. Several fractures are present on the T surface. The sample broke along at fracture during processing of the meteorite. Some oxidation halos, and some metallic flakes are visible in the greenish gray matrix of the sample. The sample appears to have a weathering rind, ~3 mm. in depth, along the T surface. The sample cannot be magnetically orientated.

Petrographic Description: Brian Mason

Chondrules are sparse and have diffuse margins which tend to merge with the granular matrix, which consists of olivine and pyroxene with minor subequal amounts of nickel-iron and troilite, some plagioclase, and accessory chromite. Minor limonitic staining is present around nickel-iron grains. Well-preserved fusion crust, 0.5 mm thick, is present along one edge. Microprobe analyses give the following compositions: olivine,  $Fa_{24}$ ; pyroxene,  $Fs_{20}$ ; plagioclase,  $An_{10}$ . The meteorite is an L6 chondrite.

ALHA 78103 is an L6 chondrite similar to ALHA 78104 in all respects.

Sample No.: ALHA78104  
 Field No.: 241  
 Weight (gms): 672.4  
 Meteorite Type: L6 Chondrite

Location: Allan Hills

Physical Description:

The W surface of the meteorite is partially covered with black fusion crust, which is weathering away. The remainder of the specimen is rough on a centimeter scale, and is weathered and stained by iron-oxidation. A large clast, ~7 mm., is present on the N surface, and a smaller clast, ~3 mm., that appears metallic is present on the T surface. A number of smaller clasts, which appear to be metallic, are scattered over the surface of the specimen. When the specimen was cleaved during processing, a light gray matrix with metallic particles was exposed. An area ~1 cm. x 3 cm. in the matrix is a darker gray. A weathering rind, ~5 mm. deep, occurs along some exterior margins.

Petrographic Description: Brian Mason

Chondrules are sparse and have diffuse margins which tend to merge with the granular matrix, which consists of olivine and pyroxene with minor subequal amounts of nickel-iron and troilite, some plagioclase, and accessory chromite. Minor limonitic staining is present around nickel-iron grains. Well-preserved fusion crust, 0.5 mm thick, is present along one edge. Microprobe analyses give the following compositions: olivine,  $Fa_{24}$ ; pyroxene,  $Fs_{20}$ ; plagioclase,  $An_{10}$ . The meteorite is an L6 chondrite.

ALHA78104 is an L6 chondrite similar to ALHA78103 in all respects.

Sample No.: ALHA78106  
 Field No.: 400  
 Weight (gms): 464.5  
 Meteorite Type: L6 Chondrite

Location: Allan Hills

Physical Description:

Ice was noted on the sample when removed from the freezer. This semi-pyramidal shaped specimen appears to be unweathered. It is completely covered with a spotted brown, black, polygonally fractured, ~1mm thick fusion crust. Shallow regmaglypts are present on all surfaces. A small portion ~2cm. x 1cm., of fusion crust was broken off the W surface, revealing a nonweathered, light gray matrix with dark and light clasts, as much as 1mm. in diameter.

When the meteorite was cleaved in half during processing, abundant unoxidized metal was observed. Light and dark clasts, as much as 2mm. in diameter, were present in the light gray matrix.

Petrographic Description: Brian Mason

Chondrules are sparse and poorly defined, tending to merge with the granular groundmass, which consists of olivine and pyroxene with minor subequal amounts of nickel-iron and troilite, plagioclase, and accessory chromite. Well-developed fusion crust, 0.6 mm thick, rims one edge of the section. The meteorite appears to be completely unweathered, being free of limonitic staining (a recent fall?).

Microprobe analyses give the following compositions: olivine,  $Fa_{24}$ ; pyroxene,  $Fs_{20}$ ; plagioclase,  $An_{11}$ . The meteorite is an L6 chondrite.

Sample No.: ALHA78107  
 Field No.: 473  
 Weight (gms): 198.4  
 Meteorite Type: H5 Chondrite

Location: Allan Hills

Physical Description:

The B, S, and portions of the E surfaces are covered with a thin, black polygonally fractured fusion crust, which is slightly stained by iron-oxidation. There are shallow regmaglypts present on the S surface. The remaining surfaces are fracture surfaces and are weathered and stained a reddish-brown. No unweathered material was exposed in the sample during processing.

Petrographic Description: Brian Mason

Chondritic structure is well developed, chondrules ranging from 0.3-1.2 mm across; a variety of types is present, the commonest being granular olivine and olivine-pyroxene, barred olivine, and fine-grained pyroxene. The chondrules are set in a fine-grained aggregate of olivine and pyroxene, with minor amounts of nickel-iron and troilite (nickel-iron in excess of troilite). Limonitic staining pervades the section, and occasional patches of red-brown limonite are seen.

Microprobe analyses give the following compositions: olivine,  $Fa_{18}$ ; pyroxene,  $Fs_{17}$ . The meteorite is classified as an H5 chondrite.

Sample No.: ALHA78108  
 Field No.: 399  
 Weight (gms): 172.5  
 Meteorite Type: H5 Chondrite

Location: Allan Hills

Physical Description:

Only the T and N surfaces of the specimen (6.0 x 5.5 x 4.0 cm) have remnant patches of fusion crust. The other surfaces of the specimen are fracture surfaces that have been weathered and stained by iron-oxidation. Several fractures are apparent on the exterior of the sample.

This sample appears to be severely shocked. During chipping many slicken side surfaces were exposed. The sample is brecciated and two veins of black material (~1mm wide) with higher relief than the surrounding material, are present in the interior of the stone.

Petrographic Description: Brian Mason

Chondritic structure is well developed, with chondrules ranging from 0.3-0.9 mm across. The chondrules are set in a fine-grained matrix which consists largely of olivine and pyroxene, with minor amounts of nickel-iron and troilite (nickel-iron in excess of troilite). Brown limonitic staining is present around the metal grains. Microprobe analyses give the following compositions: olivine, Fa<sub>18</sub>; orthopyroxene, Fs<sub>16</sub>; plagioclase, An<sub>12</sub>. The meteorite is classified as an H5 chondrite.

Sample No.: ALHA78109  
 Field No.: 248  
 Weight (gms): 233.2  
 Meteorite Type: LL5 Chondrite

Location: Allan Hills

Physical Description:

Dull black fusion crust covers approximately 75% of this approximately 7.0 x 5.5 x 3.5 cm. sample. The portions of the specimen devoid of fusion crust are light gray in color with abundant dark gray chondrules that are as great as 2 cm. in maximum diameter. These chondrules are easily removed from the exterior of the sample, and many fall out on handling. Several larger gray clasts and what appears to be troilite nodules, ranging from ~3 mm. to 10 mm. are also present. Where the sample was cleaved to divide with Japan, a light gray interior that is essentially free of iron oxidation was exposed. However, some material that appears to be troilitic in the interior of the specimen is oxidized and friable.

Petrographic Description: Brian Mason

Chondrules are prominent and well-defined, 0.6-2.4 mm in diameter; some are broken or deformed. A variety of types is present, the commonest being granular olivine, barred olivine, and fine-grained pyroxene. The matrix is dominantly olivine with lesser amounts of pyroxene, and a little nickel-iron and troilite; plagioclase is present as very small grains difficult to recognize. The section shows a little limonitic staining around some metal grains. Microprobe analyses gave the following compositions: olivine, Fa<sub>28</sub>; orthopyroxene, Fs<sub>28</sub>; plagioclase, An<sub>11</sub>. The meteorite is classified as an LL5 chondrite.

Sample No.: ALHA78110  
 Field No.: 499  
 Weight (gms): 160.7  
 Meteorite Type: H5 Chondrite

Location: Allan Hills

Physical Description:

All but the B surface of the sample (7.0 x 5.0 x 2.5 cm.) is covered with a thin, patchy, black fusion crust. Small rounded and irregular inclusions are visible through the fusion crust. The B surface of the sample is weathered and stained reddish-brown by iron-oxidation and has two chondrules protruding from the surface. Several fractures penetrate the sample.

The matrix of the sample is reddish-brown and has many inclusions and chondrules (as great as 2mm in diameter) as well as metallic fragments.

Petrographic Description: Brian Mason

Chondritic structure is well developed, with chondrules ranging from 0.3-1.4 mm across; a variety of types is present, the commonest being granular olivine and olivine-pyroxene, porphyritic olivine, and fine-grained pyroxene. The groundmass consists largely of fine-grained olivine and pyroxene, with minor amounts of nickel-iron and troilite. A considerable amount of brown limonite is present, generally in association with the metal grains. Microprobe analyses give the following compositions: olivine,  $Fa_{18}$ ; orthopyroxene,  $Fs_{16}$ ; plagioclase,  $An_{13}$ . The meteorite is classified as an H5 chondrite.

Sample No.: ALHA78112  
 Field No.: 260  
 Weight (gms): 2485.0  
 Meteorite Type: L6 Chondrite

Location: Allan Hills

Physical Description:

Snow and/or ice was present on the sample,  $\sqrt{14} \times 13 \times 13$  cm., when it was removed from cold storage. The specimen is covered with a 0.5 mm to 1 mm. fusion crust on four surfaces. On one of these surfaces the fusion crust has weathered to a brown color, while on the other surfaces the fusion crust is black. The S surface is a fracture surface that is 80% weathered and stained by iron-oxidation. The unweathered material is yellowish and appears homogeneous. Three fractures are present on the sample, two of these appear to be shallow. Sawing the specimen during processing revealed a light gray matrix material with oxidation halos around most of the visible metallic grains. Two interior cracks exist, but with no preferential weathering along them. Clasts as much as 3 mm. in diameter are present.

Petrographic Description: Brian Mason

Chondrules are sparse and ill-defined, their borders tending to merge with the granular groundmass, which consists mainly of olivine and pyroxene, with minor subequal amounts of nickel-iron and troilite, plagioclase, and accessory chromite. A moderate amount of limonitic staining is associated with the nickel-iron grains. Microprobe analyses give the following compositions: olivine,  $Fa_{25}$ ; pyroxene,  $Fs_{20}$ ; plagioclase,  $An_{10}$ . The meteorite is an L6 chondrite. ALHA 78114 is another L6 chondrite, similar to ALHA 78112 in all respects.

Sample No.: ALHA78114  
 Field No.: 382  
 Weight (gms): 808.1  
 Meteorite Type: L6 Chondrite

Location: Allan Hills

Physical Description:

The B surface of the meteorite is planar and contains small patches of dull black fusion crust on a shiny reddish-brown background, which may possibly be severely weathered fusion crust. All other surfaces of the specimen are totally covered with dull black fusion crusts with the exception of some small areas on the S surface where it has been removed. Small regmaglypts are present on the S surface. Many shallow voids are present on the exterior of this sample. One large fracture that appears to penetrate the stone was noted.

This specimen was cleaved along the large crack, which exposed mostly weathered material. The unweathered material exposed during processing is light gray and flecked with light and dark, ~1mm., clasts.

Petrographic Description: Brian Mason

Chondrules are sparse and ill-defined, their borders tending to merge with the granular groundmass, which consists mainly of olivine and pyroxene, with minor subequal amounts of nickel-iron and troilite, plagioclase, and accessory chromite. A moderate amount of limonitic staining is associated with the nickel-iron grains. Microprobe analyses give the following compositions: olivine,  $\text{Fa}_{25}$ ; pyroxene,  $\text{Fs}_{20}$ ; plagioclase,  $\text{An}_{10}$ . The meteorite is an L6 chondrite. ALHA 78114 is another L6 chondrite, similar to ALHA 78112 in all respects.

Sample No.: ALHA78115  
 Field No.: 294  
 Weight (gms): 847.6  
 Meteorite Type: H6 Chondrite

Location: Allan Hills

Physical Description:

This sample is smooth and rounded. There is scattered fusion crust on the B and E surfaces, and a very small amount on the W surface. The fusion crust is black, thin and pitted. Where the sample is devoid of fusion crust it is smooth and weathered a reddish-brown. Clasts and chondrules, as much as 9 mm. in diameter, are present. It appears that one corner on the N surface has been broken off, but the surface is weathered and stained similar to the remainder of the sample. The interior of the meteorite, exposed during processing, contains metallic particles and is moderately weathered.

Petrographic Description: Brian Mason

A few ill-defined chondrules are present. Most of the section shows a granular aggregate consisting largely of olivine and pyroxene, with minor amounts of plagioclase, nickel-iron, and troilite (nickel-iron in excess of troilite). Grains of brown limonite are present throughout the section, and are concentrated below remnants of fusion crust along one edge. Microprobe analyses give the following compositions: olivine  $\text{Fa}_{18}$ ; pyroxene,  $\text{Fs}_{16}$ ; plagioclase,  $\text{An}_{12}$ . The meteorite is an H6 chondrite.

Sample No.: ALHA78126  
 Field No.: 383  
 Weight (gms): 606.9  
 Meteorite Type: L6 Chondrite

Location: Allan Hills

Physical Description:

The NE corner of this sample (~12 x 8 x 5 cm) has been removed. A thin, ~1mm, black fusion crust that is polygonally fractured in the B surface, and is weathering to a brown in some areas, covers the remainder of the specimen. Some areas of the fusion crust have weathered away, revealing a partially weathered, yellowish-gray matrix material. Some metallic looking particles are apparent on the broken surface. A deep fracture extends along the T and S faces.

During processing of the sample, it became apparent that weathering penetrated the sample as much as 0.5 cm. below the fusion crust. The matrix material exposed during processing is greenish-gray, with several veins of what appears to be darker matrix material penetrating it. Small metallic looking particles were also apparent in this friable sample.

Petrographic Description: Brian Mason

Chondrules are sparse and poorly defined, their borders tending to merge with the granular groundmass, which consists largely of olivine and pyroxene with minor subequal amounts of nickel-iron and troilite, plagioclase, and accessory chromite. A moderate amount of brown limonitic staining is present around the nickel-iron grains. Microprobe analyses give the following compositions: olivine,  $Fa_{25}$ ; pyroxene,  $Fs_{21}$ ; plagioclase,  $An_{10}$ . The meteorite is an L6 chondrite.

ALHA 78130, 78131 are L6 chondrites similar in all respects to ALHA78126.

Sample No.: ALHA78127  
 Field No.: 495  
 Weight (gms): 194.5  
 Meteorite Type: L6 Chondrite

Location: Allan Hills

Physical Description:

Sample is covered with very thin, shiny fusion crust on the T, B, N and W surfaces. The S surface has remnant patches of fusion crust and the E surface is a fracture surface. The B surface is partially stained by iron oxidation. Where fusion crust is absent, the sample is reddish-brown. Polygonal fractures cover most surfaces.

Chipping the sample during processing revealed that nearly the entire sample is severely weathered. One small area of the matrix is not severely weathered and is yellowish gray.

Petrographic Description: Brian Mason

Chondritic structure is poorly developed, the sparse chondrules tending to merge with the granular groundmass, which consists largely of olivine and pyroxene, with minor subequal amounts of nickel-iron and troilite, a little plagioclase, and accessory chromite. Minor limonitic staining is associated with the metal grains. Microprobe analyses gave the following compositions: olivine,  $Fa_{24}$ ; orthopyroxene,  $Fs_{20}$ ; plagioclase,  $An_{10}$ ; and a single grain of diopside,  $Wo_{46}En_{47}Fs_7$ . The meteorite is classified as an L6 chondrite.

Sample No.: ALHA78128  
 Field No.: 250  
 Weight (gms): 154.7  
 Meteorite Type: H5 Chondrite

Location: Allan Hills

Physical Description:

The sample is completely devoid of fusion crust. It is weathered and stained a dark reddish-brown and is shiny in some areas. On the B surface the specimen has some small spots that are nearly black, while in other areas the weathering is not as severe and chondrules (max. diameter 2mm.) can be detected. The sample is extensively fractured.

Chipping revealed only a slight amount of material that was not severely weathered.

Petrographic Description: Brian Mason

Chondritic structure moderately well developed, with chondrules ranging from 0.2-2.4 mm across; the commonest types are granular olivine, barred olivine, and fine-grained radiating pyroxene. The groundmass consists largely of olivine and pyroxene, with minor amounts of nickel-iron and troilite. The meteorite is extensively weathered, with much of the nickel-iron altered to brown limonite. Microprobe analyses give the following compositions: olivine, Fa<sub>10</sub>; orthopyroxene, Fs<sub>17</sub>; plagioclase, An<sub>10</sub>. The meteorite is classified as an H5 chondrite.

Sample No.: ALHA78130  
 Field No.: 386  
 Weight (gms): 2733.0  
 Meteorite Type: L6 Chondrite

Location: Allan Hills

Physical Description:

This specimen, 18 x 9 x 9 cm, is completely covered with a thin, dull black fusion crust, with the exception of an ~4 x 4 cm. area on the W surface and along the edges of the sample. Preferential weathering of the fusion crust around included clasts occurs. The sample is covered with shallow regmaglypts and several large fractures penetrate the sample. Chipping of the sample during processing revealed a severely oxidized interior for ~70% of the sample. The unweathered portion is light gray and speckled with light and dark clasts, ~1-2 mm.. Several larger (~0.5 cm.) gray clasts were noted. Small veins of a darker gray material, ~2-3 cm. in length and 3 mm. wide, are present in the lighter matrix material.

Petrographic Description: Brian Mason

Chondrules are sparse and poorly defined, their borders tending to merge with the granular groundmass, which consists largely of olivine and pyroxene with minor subequal amounts of nickel-iron and troilite, plagioclase, and accessory chromite. A moderate amount of brown limonitic staining is present around the nickel-iron grains. Microprobe analyses give the following compositions: olivine, Fa<sub>25</sub>; pyroxene, Fs<sub>21</sub>; plagioclase, An<sub>10</sub>. The meteorite is an L6 chondrite.

ALHA 78130, 78131 are L6 chondrites similar in all respects to ALHA78126.



Sample No.: ALHA78131  
 Field No.: 404  
 Weight (gms): 268.8  
 Meteorite Type: L6 Chondrite

Location: Allan Hills

Physical Description:

A thin, shiny black fusion crust covers the specimen, with the exceptions of most of T surface and portions of the N and B surfaces. Shallow regmaglypts are present on the S, W, and T surfaces. The surfaces that are devoid of fusion crust are weathered and stained by iron-oxidation and range texturally from smooth to rough on a centimeter scale. Several light colored clasts are present on the surfaces devoid of fusion crust. No fractures are present on the sample. When the meteorite was cleaved during processing, only a small amount of unweathered material was exposed.

Petrographic Description: Brian Mason

Chondrules are sparse and poorly defined, their borders tending to merge with the granular groundmass, which consists largely of olivine and pyroxene with minor subequal amounts of nickel-iron and troilite, plagioclase, and accessory chromite. A moderate amount of brown limonitic staining is present around the nickel-iron grains. Microprobe analyses give the following compositions: olivine,  $Fa_{25}$ ; pyroxene,  $Fs_{21}$ ; plagioclase,  $An_{10}$ . The meteorite is an L6 chondrite.

ALHA78130, 78131 are L6 chondrites similar in all respects to ALHA78126.

Sample No.: ALHA78134  
 Field No.: 403  
 Weight (gms): 458.3  
 Meteorite Type: H4 Chondrite

Location: Allan Hills

Physical Description:

Snow and ice remained on the sample (7.0 x 5.0 x 7.5 cm.) when it was removed from cold storage. Dull black fusion crust covers nearly 40% of the sample. The remaining surfaces are weathered and stained by iron oxidation. On the S surface the inclusions in the meteorite have a higher relief than the surrounding matrix, probably as a result of preferential weathering. Inclusions (chondrules and lithic fragments) are visible on the other fracture surfaces but have not experienced any preferential weathering. In several areas the weathered material appears granular. Several large fractures penetrate the sample. When the sample was divided during processing, 60% of the interior was stained reddish-brown. The remaining 40% is light gray and contains many clasts, (1mm or less). Oxidation halos are also present in this material.

Petrographic Description: Brian Mason

Chondrules are numerous and well developed, ranging from 0.3-1.2 mm across; a variety of types is present, the commonest being granular olivine and olivine-pyroxene, and radiating fibrous pyroxene. The chondrules are set in a fine-grained aggregate of olivine and pyroxene, with minor nickel-iron and troilite (nickel-iron in greater amounts than troilite). Some of the pyroxene is polysynthetically twinned clinobronzite. The meteorite is extensively weathered, with veinlets and patches of red-brown limonite throughout the section. Microprobe analyses show olivine of essentially uniform composition ( $Fa_{18}$ ) and somewhat variable pyroxene ( $Fs_{15}$ - $Fs_{20}$ , mean  $Fs_{17}$ ). The meteorite is classified as an H4 chondrite.

Sample No.: ALHA78153  
 Field No.: 492  
 Weight (gms): 151.7  
 Meteorite Type: LL6 Chondrite

Location: Allan Hills

Physical Description:

Fusion crust is present on the N, B and portions of the E surfaces. The fusion crust is thick (1-2 mm.) and dull brownish-black, and has a blistery texture. Many polygonal fractures are present. A weathering rind (as great as 5mm thick) is present in some areas. The fracture surfaces are dark brown in isolated areas, but the overall color is greenish-yellow. It appears that some large clasts have been plucked from the exterior surfaces of the sample.

The sample shows an unusual weathering pattern. Veins of dark reddish-brown are adjacent to areas of yellowish material. Also areas of less severely weathered matrix material, which is gray, was exposed during processing of the sample. No clasts or chondrules are discernible.

Petrographic Description: Brian Mason

Chondritic structure is barely discernible. The section showing a rather uniform granular aggregate of olivine and pyroxene with minor amounts of troilite and plagioclase, a little nickel-iron, and accessory chromite. A little limonitic staining is present in association with the metal grains. Microprobe analyses give the following composition: olivine,  $Fa_{29}$ ; orthopyroxene,  $Fs_{24}$ ; plagioclase,  $An_{11}$ ; and a single grain of diopside,  $Wo_{46}En_{45}Fs_9$ . The meteorite is classified as an LL6 chondrite.

Sample No.: ALHA78261

Location: Allan Hills

Field No.: 491

Weight (gms): 5.113

Meteorite Type: Carbonaceous Chondrite - C2

Physical Description:

This triangular sample (2.5 x 1.5 x 1.0 cm) is totally covered with thin, dull, black, polygonally fractured fusion crust, except along the edges where the fusion crust has abraded away. The matrix revealed in these areas is greenish-black and has small (<1 mm) rounded and irregular white clasts throughout. Small voids, as much as 1mm in diameter, are present on two surfaces. Chipping of the specimen during processing revealed abundant rounded and irregular inclusions in the meteorite.

Petrographic Description: Brian Mason

The section shows numerous tiny grains (up to 0.1 mm) and irregular aggregates (up to 0.3 mm) of olivine and polysynthetically twinned clinopyroxene, and a few small chondrules, in a translucent isotropic olive-brown matrix. The section contains very little troilite as minute scattered grains, and a little nickel-iron as inclusions in the chondrules. Porous fusion crust up to 2.5 mm thick rims part of the section. Microprobe analyses show that both olivine and pyroxene have variable composition. Olivine ranges from  $Fa_6$  to  $Fa_{50}$ , with an average of  $Fa_6$ ; it has a notable chromium content,  $Cr_2O_3$  ranging from 0.3-0.6 weight percent. Pyroxene is generally close to clinoenstatite in composition, ranging from  $Fs_1$  to  $Fs_8$ , with an average of  $Fs_7$ . This meteorite is a carbonaceous (C2) chondrite, and shows a close similarity to ALHA77306.

Sample No.: ALHA78262  
 Field No.: 500  
 Weight (gms): 26.18  
 Meteorite Type: Ureilite

Location: Allan Hills

Physical Description:

The overall shape of this specimen (4.0 x 2.5 x 2.0 cm) is triangular. A thin, dull black fusion crust is present on three surfaces. The remaining surfaces are fracture surfaces that are rough on a small scale. The surface roughness appears to be the result of exposed crystal faces. The overall color is very dark greenish-black. Chipping of the specimen during processing revealed a brownish coarse grained material. Many crystal faces were exposed on the interior surfaces.

Petrographic Description: Brian Mason

The section consists almost entirely of olivine, in rounded to subhedral grains 0.3-2.2 mm across; most of the olivine is colorless, but some grains have a pale brownish tint. A little pyroxene of similar grain size is present. The grains are rimmed with black carbonaceous material, which contains trace amounts of nickel-iron and troilite. Very thin fusion crust rims part of the section. Microprobe analyses show olivine and pyroxene of uniform composition. Olivine has a composition of  $\text{Fa}_{22}$ ; and a notably high content of calcium ( $\text{CaO}$  0.4 weight percent) and chromium ( $\text{Cr}_2\text{O}_3$  0.8 weight percent). Pyroxene composition is  $\text{Wo}_{81}\text{Fs}_{19}\text{En}_{73}$ , with  $\text{Cr}_2\text{O}_3$  1.2 weight percent. This meteorite is a ureilite and resembles ALHA 78019 in all respects.

Sample No.: BTNA78001  
Field No.: 328  
Weight (gms): 160.7  
Meteorite Type: L6 Chondrite

Location: Bates Nunatak

Physical Description:

The sample (10 x 6 x 1 cm.) is flat and has black fusion crust on all surfaces, with the exception of the B and portions of the W surfaces. The sample has been fractured into two pieces across its middle. The B surface is polished and has a mottled yellowish-red-brown appearance.

Chipping of the specimens revealed a medium gray matrix with inclusions (<1mm.). The sample has a prominent (1mm) weathering rind.

Petrographic Description: Brian Mason

Chondritic structure is barely discernible, the sparse chondrules merging with the granular groundmass, which consists largely of olivine and pyroxene, with minor subequal amounts of nickel-iron and troilite, maskelynite, and accessory chromite. The section shows some dark veinlets, up to 0.6 mm thick, which consist of a very fine-grained aggregate of opaque material and transparent isotropic material; the latter may be majorite and ringwoodite. Brown limonitic staining pervades the section. Microprobe analyses show olivine ( $Fa_{24}$ ) and orthopyroxene ( $Fs_{21}$ ) of uniform composition; the maskelynite has  $CaO$  (2.0%) appropriate to oligoclase composition, but has deficient and variable  $Na_2$  content (4.3-7.0%). The meteorite is classified as an L6 chondrite.

Sample No.: META78003  
 Field No.: 335  
 Weight (gms): 1726.0  
 Meteorite Type: L6 Chondrite

Location: Meteorite Hills

Physical Description:

The E, T and W surfaces of the sample are covered with a thin (~1mm) dull black fusion crust that has been removed in some areas, revealing a reddish weathered surface. The remaining surfaces are fracture surfaces that are weathered and stained reddish. Light colored inclusions are apparent on the fracture surface. Chipping and sawing of the meteorite during processing revealed a greenish-gray matrix with many oxidation halos around inclusions. Dimensions of sample: ~15.0 x 7.5 x 8.0 cm.

Petrographic Description: Brian Mason

The section shows sparse chondrules with diffuse margins which tend to merge with the granular groundmass. The groundmass consists largely of olivine and pyroxene with minor subequal amounts of nickel-iron and troilite, some plagioclase, and accessory chromite. Fusion crust, 0.3 mm thick, is present along one edge. Minor limonitic staining is associated with the nickel-iron grains. Microprobe analyses give the following compositions:  $Fa_{24}$ ; pyroxene,  $Fs_{21}$ ; plagioclase,  $An_{10}$ . The meteorite is an L6 chondrite.

Sample No.: META78005  
 Field No.: 339  
 Weight (gms): 172.0  
 Meteorite Type: L6 Chondrite

Location: Meteorite Hills

Physical Description:

Three surfaces of the sample (6.5 x 5.5 x 4.0 cm) are covered with dull, polygonally fractured, black fusion crust. The surfaces devoid of fusion crust are fracture surfaces that are reddish-yellow, due to weathering and iron oxidation staining, and contain many inclusions with greater relief than the surrounding matrix material.

Chipping of the meteorite during processing, revealed a light, gray matrix with small clasts. Non-oxidized metallic particles are present.

Petrographic Description: Brian Mason

Chondritic structure is barely discernible, the sparse chondrules merging with the granular groundmass, which consists largely of olivine and pyroxene, with minor subequal amounts of olivine and pyroxene, some plagioclase, and accessory chromite. Minor limonitic staining is present around the metal grains. Microprobe analyses give the following compositions: olivine,  $Fa_{24}$ ; orthopyroxene,  $Fs_{20}$ ; plagioclase,  $An_{10}$ . The meteorite is classified as an L6 chondrite.

Sample No.: META78010  
 Field No.: 351  
 Weight (gms): 233.5  
 Meteorite Type: H-5 Chondrite

Location: Meteorite Hills

Physical Description:

Ice was present on the sample when it was removed from cold storage. Smooth black fusion crust covers the entire specimen.

Upon cleaving this stone into approximately two equal halves, a light dark structure was revealed. Dark vein-like areas, which contain small light colored clasts (~0.1 - 0.2 cm.), totally enclosed large lighter colored clasts as large as 1 cm x 0.5 cm.. In some areas the stone is weathered to a dark reddish-brown.

Dimensions: 8.5 x 5 x 4.5 cm.

Petrographic Description: Brian Mason

Chondritic structure is moderately well developed, but the chondrules tend to merge with the granular groundmass, which consists largely of olivine and pyroxene, with minor amounts of nickel-iron and troilite (nickel-iron in excess of troilite).

Microprobe analyses give the following compositions: olivine, Fa<sub>19</sub>; pyroxene, Fs<sub>17</sub>. The meteorite is classified as an H5 chondrite.

Sample No.: META78028  
 Field No.: 333  
 Weight (gms): 20657.0  
 Meteorite Type: L-6 Chondrite

Location: Meteorite Hills

Physical Description:

Four surfaces of this angular stone are covered with a thin, dull, black fusion crust, and two surfaces are fracture surfaces which are red-brown in color.

Sawing this specimen in half revealed an interior with a light gray matrix that contains inclusions up to 5 mm. in diameter. Oxidation halos occur around all of the metal and gives the cut face a mottled look. Two large fractures run across the saw face, one has a large area of oxidation along its entire length. Further sawing exposed a chondrule ~8 mm. in diameter.

Dimensions: 35 x 17 x 21 cm.

Petrographic Description: Brian Mason

The section shows sparse and poorly defined chondrules whose margins merge with the granular groundmass, which consists largely of olivine and pyroxene with minor subequal amounts of nickel-iron and troilite, and a little plagioclase. A minor amount of brown limonitic staining is present, mostly in association with the grains of nickel-iron. Microprobe analyses show olivine (Fa<sub>25</sub>), orthopyroxene (Fs<sub>21</sub>), and plagioclase (An<sub>10</sub>) of uniform composition. The meteorite is classified as an L6 chondrite.

Sample No.: RKPA78002  
Field No.: Reakling Peak #2  
Weight (gms): 8483.0  
Meteorite Type: H4 Chondrite

Location: Reakling Peak

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Physical Description:

This tabular shaped meteorite has 4 flat and 2 semi-rounded surfaces with sharp ridges. 0.5 mm thick black, polygonally fractured fusion crust covers the entire specimen except for areas along the ridges where it has been broken off. The areas void of fusion crust are greenish-brown in color and contain numerous inclusions. One fracture penetrates the interior of the meteorite. After drying for several days in the nitrogen cabinet, minute amounts of white deposit appeared along the polygonal fractures. The cut face reveals a weathering rind ~1-4 mm thick. Abundant metal blebs are obvious. with most of the metal having oxidation halos around them. Several chondrules (~2mm diameter) are present. Dimensions: 17 x 13.5 x 17 cm.

Petrographic Description: Arch Reid

Chondrules, ranging from 0.2 to 1.5 mm but mostly sub mm., are abundant and many are well-defined. Porphyritic chondrules, with equant euhedral olivines and with elongate skeletal olivines in turbid devitrified glass, are common. Fine-grained pyroxene-rich chondrules, including excentroradial pyroxene aggregates, are also common. Spherical chondrules have well-defined borders whereas irregular chondrules and chondrule fragments tend to merge with the matrix. The matrix contains abundant metallic iron, troilite, olivine and pyroxene with some isolated large olivine and pyroxene crystals. Olivine and pyroxene are unzoned and some of the pyroxene grains are polysynthetically twinned clinobronzite. Microprobe analyses show uniform olivine (Fa<sub>18.5</sub>) and pyroxene (Wo<sub>1</sub><sup>5</sup>En<sub>83</sub>Fs<sub>15</sub>). Limonite staining is present in minor amounts. The meteorite is classified as an H4 chondrite.

## Update Descriptions of Iron Meteorites

The following are detailed descriptions and classifications of several iron meteorites whose macroscopic descriptions were previously reported in the Newsletter.

### ALHA 77250

#### Tentative Classification

Roy S. Clarke, Jr.

An area of approximately 60 cm<sup>2</sup> of macroetched surface was examined. Kamacite band widths are in the 2.5 to 3.5 mm range, with a length to width ratio of about 4. Neumann bands are present, and the rim of the slice contains several areas that have been converted to  $\alpha_2$  by atmospheric ablation. Patches of recrystallized kamacite occur throughout the slice. Taenite is present along kamacite grain boundaries and some area of comb plessite were observed. One large troilite and one large troilite-carbon inclusion are present. These inclusions are surrounded by schreibersite which in turn is surrounded by cohenite. Schreibersite is also present as a grain boundary precipitate. External weathering is uniform and moderately severe. The specimen is a coarse octahedrite, a typical Group I or Og meteorite.

### ALHA 77255

#### Tentative Description

Roy S. Clarke, Jr.

Approximately 10 cm<sup>2</sup> of macroetched surface and 20 cm<sup>2</sup> of sawn surface were examined. The etch pattern is uniform, indistinct, fine, and free of inclusions. The complete rim of the specimen has been altered by atmospheric ablation. The saw cut that removed the slice from the main mass passed through the edge of a spherical silicate (?) inclusion approximately 5 mm in diameter. Most of this inclusion remains within the butt. Several small inclusions that appear to be sulfides are present on this sawn surface. External weathering appears to have been moderate. This is an unusual meteorite, and insufficient information is available at this time for even a tentative classification.

### ALHA 77263

#### Tentative Classification

Roy S. Clarke, Jr.

An area of approximately 20 cm<sup>2</sup> of macroetched surface was examined. Kamacite band widths are in the 2 to 2.5 mm range with a length to width ratio of 2 to 4. Neumann bands are present, and along more that half of the rim of the slice kamacite has been converted to  $\alpha_2$  by atmospheric ablation. Areas of recrystallized kamacite are unevenly distributed over the surface. Comb taenite/plessite areas and grain boundary taenite are present. Grain boundary schreibersite is present as is one 3 X 1.5 mm schreibersite. External weathering appears to have been moderately severe. This specimen is a coarse octahedrite, a typical Group I or Og meteorite.



ALHA 77283Tentative Classification

Roy S. Clarke, Jr.

An area of approximately 30 cm<sup>2</sup> of macroetched surface was examined. Kamacite band widths average approximately 1.8 mm with a length to width ratio ranging from 2 to 4. Neither Neumann bands nor ablation produced  $\alpha_2$  were observed. Structures suggestive of shock deformation are present in the kamacite. Grain boundary taenite and comb plessite areas are abundant. The surface is dominated by an unusually large amount of uniformly distributed cohenite. The cohenite is badly shattered and plucked seriously during preparation of the slice. A large troilite-graphite inclusion is present, surrounded in turn by schreibersite and cohenite. Several schreibersite inclusions enclosed in cohenite are present in the kamacite near the troilite-graphite inclusion. Difficulty was encountered in sawing through several troilite-graphite areas. Where this happened, small black knobby protrusions were present within the carbon-rich areas. These observations suggest that these areas contain diamond. External weathering of this specimen appears to have been severe. This meteorite is a carbon-rich coarse octahedrite, a Group I or Og meteorite. It has characteristics that suggest it may be a fragment of a crater forming fall.

ALHA 77289Tentative Classification

Roy S. Clarke, Jr.

An area of approximately 25 cm<sup>2</sup> of macroetched surface was examined. Kamacite band widths are difficult to measure as the kamacite crystals tend to be stubby and irregular in outline. Estimated band widths are in the 2 to 3 mm range. Patches of  $\alpha_2$  produced by atmospheric ablation are present along about half of the rim of the slice. Neumann bands are present. The dominant surface feature to the unaided eye is a highly speckled appearance due to abundant recrystallized kamacite fairly uniformly distributed over the surface. Modest amounts of grain boundary taenite and occasional small comb plessite areas are present. Schreibersite is present along grain boundaries. No large troilite or schreibersite are present and cohenite was not observed. External weathering is moderately severe. The specimen is a coarse octahedrite, a Group I or Og meteorite.

ALHA 77290Tentative Classification

Roy S. Clarke, Jr.

An area of approximately 70 cm<sup>2</sup> of macroetched surface was examined. Kamacite band widths are in the 2 to 3 mm range with a length to width ratio of 2 to 4. Along most of one edge of the specimen, kamacite has been converted to  $\alpha_2$  by atmospheric ablation. Neumann bands are present. Patches of recrystallized kamacite are sparsely distributed on the surface, and particularly concentrated around a large troilite-graphite inclusion that abutts only kamacite. Taenite is present at grain boundaries and in small comb plessite areas. Lamellar and grain boundary schreibersite are present. A kamacite area contains what appears to be partially decomposed cohenite surrounding a void that probably had contained schreibersite. The remnant of part of a troilite inclusion with bordering schreibersite is present at the edge of the slice. External weathering has been moderately severe. This specimen is a coarse octahedrite, a Group I or Og meteorite.

ALHA 78252Tentative Classification

Roy S. Clarke, Jr.

An area of approximately 30 cm<sup>2</sup> of macroetched surface was examined. Kamacite band widths are in the 0.5 mm range, with a length to width ratio ranging from 10 to 50. One edge of the slice has a continuous rim of  $\alpha_2$  produced by atmospheric ablation. Neumann bands are present and the kamacite has a matte appearance. Some kamacite bands are mildly deformed. Kamacite grains are continuously bordered by taenite or taenite-plessite areas. Plessite areas cover perhaps 40% of the surface area. Several small troilites are present. External weathering is moderately severe. This specimen is a medium octahedrite (Om) of narrow band width, probably a Group IIIA meteorite.

PGPA 77006Tentative Classification

Roy S. Clarke, Jr.

An area of approximately 80 cm<sup>2</sup> of macroetched surface was examined. Kamacite band widths are in the 1.5 to 2 mm range, with length to width ratios ranging from 4 to 10. Neumann bands are abundant, and the kamacite along about half of the rim of the slice has been converted to  $\alpha_2$  by atmospheric ablation. Taenite and taenite-plessite areas occupy at least half of the kamacite grain boundaries, and a number of areas of comb plessite are present. Schreibersite is present in grain boundaries, and one area of lamellar schreibersite surrounded by cohenite is present. Cohenite and schreibersite are present at the edge of the slice in an area that may have bordered a troilite inclusion. No large inclusions were observed. External weathering of the specimen ranges from light to severe. The specimen is a coarse octahedrite, a typical Group I or Og meteorite.